

Sweet-Ione Project

Botany Report

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1.0 Introduction

The purpose of this Biological Evaluation is to analyze and disclose the effects of proposed activities on all federally threatened, endangered and proposed, and Forest Service Region 6 sensitive plant species that are known to occur or have the potential to occur within the Sweet-Ione project area on the Newport Ranger District of the Colville National Forest (CNF). There are no federally listed threatened, endangered, or proposed plant species known or suspected in the project area, and none were found during surveys. Whitebark pine is a proposed species and is not documented in the Sweet-Ione project area. Therefore, this report is limited to Region 6 (R6) sensitive species and their habitats.

The purpose of this project is to promote forest health and resiliency within the Sweet-Ione project area. This document is an analysis of the effects to sensitive plants that could result from proposed activities, including timber harvest, fuels reduction, road construction and decommissioning, and associated habitat improvement activities. Sensitive plants were not related to the purpose and need or any issues identified through project scoping. Proposed actions are unlikely to affect sensitive plants as design criteria measures would be implemented.

Nine Forest Service sensitive plant species; crenulate moonwort (*Botrychium crenulatum*), western moonwort (*Botrychium hesperium*), stalked moonwort (*Botrychium pendunculatum*), beaked sedge (*Carex rostrata*), crested shield-fern (*Dryopteris cristata*), green keeled cotton-grass (*Eriophorum viridicatum*), water avens (*Geum rivale*), black snake-root (*Sanicula marilandica*), and kidney-leaved violet (*Viola renifolia*), occur in the Sweet-Ione project area. If any additional sites are found that are deemed necessary to ensure species and population viability and/or prevent a potential trend towards federal listing, those sites would be protected.

2.0 Relevant Laws, Regulations, and Policy

2.1 Regulatory Framework

2.1.1 Federal Regulations

Endangered Species Act

The Endangered Species Act (1973) as amended, the National Forest Management Act of 1976 (PL 94-588) and the National Environmental Policy Act (1978) require protection and consideration of threatened, endangered, and other “rare” species. The ESA directs federal agencies to ensure that actions authorized, funded, or carried out by these agencies are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of their critical habitats (ESA Section 7(a) (2)).

Other rare plant species or species of special concern are those designated as sensitive species by the Regional Forester. See Appendix A for species listed as Suspected (S) and Documented (D) by the USDA Forest Service, Region 6 Regional Forester’s Sensitive Botanical List issued July 21, 2015 that are documented or suspected to occur on the Colville National Forest.

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National Forest Management Act

The National Forest Management Act (NFMA) of 1976 is the primary statute governing the administration of national forests and was an amendment to the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on National Forest system lands. NFMA changed forest planning by requiring the Forest Service to use a systematic and interdisciplinary approach to resource management, also providing for public involvement in preparing and revising forest plans. This includes a requirement for project-level planning to be in compliance with the National Environmental Policy Act and Land and Resource Management Plans.

Forest Service Manual

Sensitive species are species identified by the Regional Forester for which population viability is currently of concern, as evidenced by significant current or predicted downward trends in population numbers or density, or by significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (USDA Forest Service 2005). The Forest Service has established direction in Forest Service Manual 2600 –Wildlife, Fish, and Sensitive Plant Habitat Management (FSM 2600, USDA Forest Service 2005)) to guide habitat management for proposed, endangered, threatened, and sensitive plant species. This direction establishes the process, objectives, and standards for conducting a biological evaluation, and ensures that these species receive full consideration in the decision making process. This report incorporates all the information required for a biological evaluation.

Forest Service Manual (FSM) direction (FSM 2672.1 and FSM 2672.43) (USDA FS 2009) requires that proposed activities are reviewed for potential effects on rare species and outlines policy, objectives and procedures. The FSM 2670 also directs national forests to assist states in achieving conservation goals for endemic species; complete biological evaluations of programs and activities; avoid and minimize impacts to species with viability concerns; analyze the significance of adverse effects on populations or habitat; and coordinate with states and USFWS.

The FSM 2670.15 defines sensitive species as those plant species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trend in numbers, density or habitat capability that would reduce a species distribution. The FSM 2670.22 directs national forests to “maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands” and FSM 2670.32 states to “avoid or minimize impacts to species whose viability has been identified as a concern.”

2.1.2 Land Management Plan

The Colville National Forest Land Management Plan (LMP) (USDA FS 2019), includes the following forest management goal, standards and guidelines, and desired condition for threatened, endangered, and sensitive plants:

Desired Conditions: (USDA FS 2019, page 38)

2.1.2.1 FW-DC-VEG-08. Threatened, Endangered and Sensitive Plant Species – Special and Unique Habitats

Special and unique habitats support threatened, endangered, and sensitive plant species populations and contribute to high quality suitable habitat for these species. Degraded or diminished special and unique habitats are restored within their natural range of variation.

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- *FW-DC-VEG-09. Threatened, Endangered and Sensitive Plant Species – Management-Related Disturbance*

Ecological conditions and processes that sustain the habitats currently or potentially occupied by threatened, endangered, or sensitive plant species are retained or restored. The geographic distributions of sensitive plant species in the Forest Plan area are maintained. This includes sufficient seed or vegetative reproduction to maintain existing plant populations and associated native plant community biodiversity. Soil disturbance is managed to avoid degradation of threatened, endangered and sensitive plant species and their habitat as well as plant community composition, structure, and productivity.

- *FW-DC-VEG-10. Threatened, Endangered and Sensitive Plant Species – Habitat and Population Trends*

Population trends, amount of occupied habitat, and amount of unoccupied suitable habitat are stable or increasing for threatened, endangered, and sensitive plant species.

Standards: (USDA FS 2019, pages 39-40)

- *FW-STD-VEG-02. Threatened, Endangered and Sensitive Plant Species – Surveys*
Surveys for threatened, endangered, and sensitive plant species shall be conducted in suitable habitat on National Forest System lands before ground-disturbing activities to identify and protect vulnerable populations. All existing sites are identified and managed to support rare species recovery on National Forest System lands. Suitable habitat shall be managed to enhance or maintain rare species occurrences on the Forest.

Guidelines: (USDA FS 2019, page 41)

- *FW-GDL-VEG-01. Threatened, Endangered, and Sensitive Plant Species – Disturbance in Occupied Habitat*

Soil and habitat disturbance should be managed within occupied habitat and suitable whitebark pine habitat to the extent practicable to maintain or enhance threatened, endangered, and sensitive plant populations and avoid invasive plant species establishment or spread. Consequently, occupied habitat should not be used for timber harvest, fuel breaks or developments associated with wildfire suppression, delivery of fire retardant or petroleum products, placement of stock-handling facilities, recreation, or special use developments. A 100-foot buffer between the occupied habitat and these management activities should be maintained, unless habitat restoration activities are designed to benefit threatened, endangered, and sensitive plant species.

Trees in occupied habitat that are felled for safety reasons should be retained on site as needed to maintain, protect, or enhance habitat unless such action is detrimental to the threatened, endangered, and sensitive species population or habitat and represents a threat through physical impacts or potential uncharacteristic wildfire.

All new road and trail construction should be designed to avoid the occupied habitat of threatened, endangered, and sensitive plant species (minimum 100-foot buffer).

Use of prescribed fire should be avoided in occupied habitat except in areas occupied by fire-dependent or fire-tolerant species. Slash piles and other fuels should be managed to avoid the occupied habitat of threatened, endangered, and sensitive species (minimum 100-foot buffer).

Grazing management (including timing, intensity, duration, frequency of use, and type and class of livestock) should allow for completion of threatened, endangered, and sensitive plant species annual life cycle and development and dispersal of reproductive materials like seed and spores. Salting or water developments should not be authorized or allowed such that they reduce threatened, endangered, or sensitive plant populations.

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Mining operations shall be conducted to minimize adverse environmental impacts on national forest surface resources. Operations approved in a Plan of Operations shall avoid threatened, endangered, and sensitive plant species and their habitat to the extent practicable.

Additionally, the Colville National Forest LMP (USDA FS 2019), includes the following forest management desired conditions for native plants:

Desired Conditions: (USDA FS 2019, page 34)

- *FW-DC-VEG-01. Plant Species Composition*
Native species and native plant communities are the desired dominant vegetation. National Forest System lands contribute to the diversity, species composition, and structural diversity of native upland plant communities. The full range of potential natural vegetation is maintained on the Forest where it supports plant and animal diversity including pollinators and other invertebrates, and robust ecological function.
- *FW-DC-VEG-06. Native Plant Materials*
Locally collected native plant materials are incorporated into project planning and implementation when restoration, rehabilitation, and revegetation goals support ecosystem integrity and resilience. Locally adapted plant material inventories are maintained to provide for revegetation project needs.

3.0 Environmental Effects

3.1 Existing Condition

Assumptions

The following assumptions were used:

- The sensitive species list and descriptions of Colville National Forest sensitive plant species are valid and were used for the analysis.
- Species on the Regional Forester's Sensitive Species List that occur on or are suspected to occur on the Colville National Forest have been identified.
- Geographic information systems combined with habitat information, on-the-ground experience and past surveys are useful to screen areas of low probability of species occurrence.
- Surveys were not conducted for fungi species because surveys are deemed impractical for determining presence.
- The effects of past activities are represented in the current condition of sensitive plant occurrences and habitats.
- All design criteria included in the proposed action would be implemented.
- Natural disturbances including wildfire, floods, storm damage, and others are likely to occur in the future.

Methodology

Effects to sensitive plant species are evaluated based on field survey results, presence of occurrences and suitable habitats, and the expected responses of each species to the proposed activities.

Information Sources

A review of these sources provided the basis for this analysis:

Federally listed and candidate species (USDI FWS 2020).

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Natural Resources Management Database for sensitive plant sightings and surveys (USDA FS 2020).

Region 6 Regional Forester's Special Status Species List (USDA FS 2015).

Washington Natural Heritage Program (WNHP 2019, WNHP and USDI BLM 2020).

The Colville National Forest is mandated to protect species viability for plants listed on the 2015 Final Region 6 Regional Forester Special Status Species List (USDA FS 2015). Botanical surveys on NFS lands are conducted for sensitive species documented or suspected to occur in planning areas with suitable habitat.

Plant surveys were conducted for many proposed units in the project area where ground disturbance might occur and some adjacent areas. During the pre-field review, species that normally occur outside of the elevation range of the project area or those where typical habitat is not present are omitted from further analysis. Field reconnaissance is limited to areas within, adjacent or near the project area where proposed ground disturbing activities may affect sensitive plant species. Intuitive controlled plant surveys were conducted in 2018 and 2019. Data collection for dates surveyed is on file at the Supervisor's Office.

The intuitive controlled method first involves walking through the project area and the perimeter of the potential habitat. Next, the surveyor conducts a complete examination of specific areas of the project or walks more than once through the area. During these surveys, no new sensitive plant occurrences were located. Occurrences are defined by the Washington Natural Heritage Program as Element Occurrences. A map showing areas surveyed is on file at the Supervisor's Office.

Threatened, Endangered, and Proposed Plants

The Sweet-Ione project area is entirely included within the boundaries of Pend Oreille County, Washington. For this county, the USDI Fish and Wildlife Service (FWS) lists one proposed species (whitebark pine, *Pinus albicaulis*) under the Endangered Species Act of 1973 (USFWS 2020, <https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=53051>).

No federally threatened, endangered, or proposed plant species are known to occur on the Colville National Forest (CNF). Whitebark pine, a species proposed for listing as threatened, is not documented within the project area. As such, implementation of project activities will result in no effect and will not result in jeopardy to the species.

Sensitive Plants

Sensitive species, as determined by the Regional Forester (USDA FS 2015), are those for which population viability is a concern. This can be indicated by a current or predicted downward trend in population numbers or suitable habitat which would reduce the species' existing distribution. Fifty-four vascular and non-vascular sensitive plant species on the Regional Forester's Special Status Species List (2015) are documented or suspected for the Colville National Forest (Appendix A). Nine Forest Service sensitive plant species, crenulate moonwort (*Botrychium crenulatum*), western moonwort (*Botrychium hesperium*), stalked moonwort (*Botrychium pendunculosum*), beaked sedge (*Carex rostrata*), crested shield-fern (*Dryopteris cristata*), green keeled cotton-grass (*Eriophorum viridicatum*), water avens (*Geum rivale*), black snake-root (*Sanicula marilandica*), and kidney-leaved violet (*Viola renifolia*), occur in the Sweet-Ione project area. Of the fifteen occurrences of sensitive species documented from the analysis area, ten are located within proposed treatment units and five directly adjacent to a unit.

Within two miles of the project area, populations of the following species are documented: least bladderly milk vetch (*Astragalus microcystis*), crenulate moonwort (*Botrychium crenulatum*), western moonwort (*Botrychium hesperium*), stalked moonwort (*Botrychium pendunculosum*), beaked sedge (*Carex*

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rostrata), quill sedge (*Carex tenara* var. *tenara*), bulb-bearing water-hemlock (*Cicuta bulbifera*), crested shield-fern (*Dryopteris cristata*), green keeled cotton-grass (*Eriophorum viridicatum*), arctic aster (*Eurybia merita*), water avens (*Geum rivale*), adder's tongue (*Ophioglossum pusillum*), and kidney-leaved violet (*Viola renifolia*).

Table 1. Botany resource indicators and units of measure for existing conditions

Resource Indicator	Qualitative Units of Measure	Quantitative Units of Measure
Abundance	Presence or absence	Number of occurrences, sub-populations and/or individual plants affected
Suitable Habitat	Presence or absence (based on habitat type and site conditions encountered during surveys)	
Species Viability	Determination category	

Determination Categories

This biological evaluation reviews the proposed action and alternatives in sufficient detail to determine the level of effect that would occur to Region 6 Sensitive plant species. One of four possible determinations is chosen based on the best available scientific literature, a thorough analysis of the potential effects of the project, and the professional judgment of the botanist who completed the evaluation. The four possible determinations are:

- “No impact”
- “Beneficial impact”
- “May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species”
- “Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species”

A variety of habitat types have been affected by past road construction and timber harvest activities, with often drastic changes in microsite conditions of shade, air movement, and species composition. Nonnative invasive plants such as spotted knapweed, orange hawkweed, Canada thistle, St. John's wort, and oxeye daisy are present along roads and other areas of disturbance within the project boundary and were likely introduced with past activities or subsequent public vehicle access. Some weeds are expanding into suitable habitats, mainly above and below roads as well as other previously disturbed areas. Nonnative invasive plants can increase competition to sensitive species and may crowd out native plants if infestations become dense.

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3.2 Direct and Indirect Effects

The analysis area/spatial effects boundary for direct and indirect effects on sensitive plants includes the footprint of activity area disturbances (harvest and burn units, road construction, and restoration activities). Because roads are represented as line features, the road construction areas are buffered 100 feet to account for the area that could be disturbed.

If no action is taken, sensitive plant populations and habitats would remain undisturbed except in the case of wildlife and natural events (fire, flooding, hail and severe wind) or climate change impacts. The risk of direct impacts to known or undiscovered sensitive plant populations as a result of project activity would be eliminated.

Numerous forb and graminoid plant species occur in the analysis area, this includes traditional-use plants that are culturally important for the Tribes. In densely-stocked stands, understory vegetation species diversity and plant composition could be diminished because dense tree canopies and sub-canopies inhibit available sunlight from reaching the forest floor. This condition reduces ecosystem productivity and resilience by limiting biomass production, soil fertility, post-fire vegetation recovery, and availability of food for wildlife species

The spread of noxious weeds has potential for adverse impacts on sensitive plant populations and habitats. Although no new vegetation disturbance would occur if no action is taken, existing weed populations would continue to exist and potentially expand. Even with continued weed control treatments, existing weed infestations would likely expand, especially in undocumented, inaccessible sites.

Proposed Action

Construction activities proposed with the proposed action (timber harvest, fuels reduction, road construction and decommissioning, and associated habitat improvement activities) would have direct effects with the generation of new openings and ground disturbance for weed establishment. Indirect effects would be the spread of weeds from these roads acting as vectors for weed populations. It is recommended that seeding with native grass seed follow construction activities, with post monitoring and weed treatment which is included as a project design feature to reduce invasive plant spread in the short and long term future. There should be limited effects to sensitive plants with these actions.

Under the proposed action, thinning and prescribed fire treatments would benefit the understory vegetation (including tradition-use plants) by increasing plant vigor and diversity as these treatments would open the tree canopy, allowing more light to get to the ground and less competition for soil resources such as water. Understory vegetation would grow, with increased diversity of forb and graminoid species. Design elements and Standard Practices would help reduce impacts traditional plants.

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Threatened, Endangered, or Proposed Plants

Because no occurrences for threatened or endangered plants exist in the project area, there would be no effect related to the proposed action. Whitebark pine, a species proposed for listing as threatened, is not documented in the project area; therefore, there will be no effect to whitebark pine.

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Because no occurrences for threatened or endangered plants exist in the project area, there would be no effect related to the proposed action. Whitebark pine, a species proposed for listing as threatened, is not documented in the project area; therefore, there will be no effect to whitebark pine.

Sensitive Plants

Assuming the implementation of the design criteria, impacts to sensitive vascular and non-vascular botanical species or habitat would be limited.

3.3 Design Elements

Resource protection measures for sensitive plants include the following:

- Ground disturbance would be avoided within 100 feet of known populations of crenulate moonwort (*Botrychium crenulatum*), western moonwort (*Botrychium hesperium*), stalked moonwort (*Botrychium pendunculosum*), beaked sedge (*Carex rostrata*), crested shield-fern (*Dryopteris cristata*), green keeled cotton-grass (*Eriophorum viridicatum*), water avens (*Geum rivale*), black snake-root (*Sanicula marilandica*), and kidney-leaved violet (*Viola renifolia*).
- Avoid using aspen stand and spring areas in unit 84 for landing and equipment corridors.
- Individual design criteria will be developed for each meadow following silviculture and botany review.
- Notify the FS Botanist of culverts identified for replacement. Botanical surveys need to be completed for sensitive species prior to implementation of AOP replacements.
- The FS Botanist would provide maps of known populations within the project area to be reviewed prior to each implementation season. Adjustments to treatments would be made if necessary.
- Any sensitive plant populations found prior to or during implementation would be protected using design criteria appropriate for the species. A FS Botanist would be consulted to determine necessary actions to protect population viability and habitat identified during implementation.

The following project design feature pertains to revegetation:

- Native and weed free seed will be used for revegetation of disturbed areas (skid trails, landings, deck sites). Locally collected native plant materials are the first choice in revegetation, but non-native, non-invasive plant species may also be used (USDA FS 2008). A recommended seed mix is provided in Appendix B; should availability be an issue, an alternative seed mix can be agreed upon.

4.0 Cumulative Effects

Temporal effects in the short term will range from implementation to five to eight years depending on the implementation schedule for the actions. After this time most short-term effects would be diminished. Long-term effects may be apparent ten or more years after implementation. While effects from proposed activities may still be apparent 50 or more years, predicting effects beyond 50 years for botanical resources becomes too speculative for reliable analysis.

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Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past activities within the project area have led to habitat modification and fragmentation in and around the project area. Past activities or events that have affected the amount or suitability of sensitive plant habitats include road construction, road maintenance, timber harvest, grazing, herbicide treatment, vehicular traffic, recreational uses, and wildfires. Activities with ground disturbance such as road construction/maintenance and traffic, fires, range, and wildlife contribute to the cumulative increase of invasive plants. These activities may have resulted in areas becoming unsuitable for sensitive plants by removing the tree canopy or individual plants may have been directly impacted. The effects from these disturbances may have reduced the number of sensitive plant occurrences or suitable habitats within the project area. Similar to the current proposal, past activities have included design features to help protect against impacts on sensitive plants.

Current ongoing and reasonably foreseeable activities include use by Air Force for training purposes, herbicide spraying for noxious weeds, road maintenance and construction, public firewood gathering, public use of motorized vehicles, and other recreational activities such as dispersed camping, berry-picking, hunting, and hiking. These activities could result in direct damage to sensitive plants, indirect effects to sensitive plant habitats, and new disturbed sites available for colonization by weeds. No specific future activities needing further NEPA analysis are foreseeable in the project area at this time.

When the effects of past, present, and reasonably foreseeable activities are combined with the anticipated effects from the proposed activities, sensitive plants may be impacted, but their viability in the planning area is expected to be maintained due to unaffected habitat and occurrences remaining inside the project area and additional occurrences being present on the Forest.

5.0 Compliance with LMP and Other Relevant Laws, Regulations, Policies and Plans

Both no action and the proposed action would comply with the Endangered Species Act because no federally listed or proposed species or their habitats would be affected. All alternatives would maintain viable populations of native plants and the proposed activities were reviewed for potential effects on candidate and sensitive species, and thus would be compliant with Forest Service Manual direction. All alternatives would also comply with the Colville National Forest's LMP in that the ecological conditions and processes that sustain the habitats currently or potentially occupied by sensitive plant species would be retained; the geographic distributions of sensitive plant species in the Land Management Plan area would be maintained; and field surveys were conducted in suitable habitat.

6.0 References Cited

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APPENDIX A

Habitats of Documented (D) and Suspected (S) R6 Sensitive Plant Species for the Colville NF, July 2015.

Note: Global and State Ranks, and Washington Status based on WNHP, February 2017.

Vascular Species	D or S	Global & State Ranks	WA Status	Habitats
Meadow pussy-toes (<i>Antennaria corymbosa</i>)	D	G5 S1	T	Moist meadows, stream-sides, and moist open forests, 5000 ft.
Least bladdery milk-vetch (<i>Astragalus microcystis</i>)	D	G5 S2	S	Gravelly to sandy areas, from riverbanks to open forests, 1400-6200 ft.
Upward-lobed moonwort (<i>Botrychium ascendens</i>)	D	G2G3 S2	S	Coniferous forests, in wet and dry meadows, roadsides, ravines, and along perennial streams, 2100-6400 ft.
Crenulate moonwort (<i>Botrychium crenulatum</i>)	D	G3 S3	S	Western red-cedar/western hemlock forests, stream-banks, and floodplains, 2030-5500 ft.
Western moonwort (<i>Botrychium hesperium</i>)	D	G3G4 S1	T	Sagebrush shrub-lands and, moist or dry meadows, 2700-6300 ft.
Slender moonwort (<i>Botrychium lineare</i>)	D	G2? S1	T	Western red-cedar/western hemlock forests, stream-banks, and floodplains, 2000-4000 ft.
Two-spiked moonwort (<i>Botrychium paradoxum</i>)	D	G2 S2	T	Late seral western red-cedar/western hemlock forests, floodplains, terraces near perennial or intermittent streams, compacted old roadbeds, early seral lodgepole, or homestead meadows, 2400-6400 ft.
Stalked moonwort (<i>Botrychium pedunculatum</i>)	D	G2G3 S2	E	Moist or dry meadows, along perennial streams, and in coniferous forests, 1800 to 6300 ft.
Hairlike sedge (<i>Carex capillaris</i>)	D	G5 S1	T	Stream-banks, wet meadows, wet ledges, and marshy lake shores, 2800-6500 ft.
Bristly sedge (<i>Carex comosa</i>)	D	G5 S2	S	Marshes, lake shores, and wet meadows, to 2000 ft.
Bristleleaf sedge (<i>Carex eburnea</i>)	S	G4TNR SNR	S	Mixed conifer mixed forests, often on limestone ledges.
Yellow bog sedge (<i>Carex gynocrates</i>)	S	G5 S1	S	Sphagnum bogs, forested wetlands and other wet marshy places, 2600-3800 ft.
Poor sedge (<i>Carex magellanica</i> ssp. <i>irrigua</i>)	D	G5T5 S2S3	S	Fens, bogs, shady wet meadows, shrub wetlands, and ponds, 1600-7000 ft.
Smoky Mountain sedge (<i>Carex proposita</i>)	D	G5 S2	T	Rocky slopes and ridges, often on talus or granite substrate, near or above tree line.
Beaked sedge (<i>Carex rostrata</i>)	D	G4 S2	S	Quaking or floating peat, 4500-5000 ft.
Many-headed sedge (<i>Carex sychnocephala</i>)	S	G4 S2	S	Moist or wet ground adjacent to marshes or along lake shores, 1000-3000 ft.
Quill sedge (<i>Carex tenera</i> var. <i>tenera</i>)	D	G5 S1	T	Wetlands, 3000 ft.
Sparse-flowered sedge (<i>Carex tenuiflora</i>)	D	G5 S1	T	Wetland obligate of bogs, fens, swamps, wet grassy areas, and occasionally seepage areas in forests, 3000-4000 ft.
Northern-golden carpet (<i>Chrysosplenium tetrandrum</i>)	S	G5 S2	S	Seeps, rock crevices, wet banks, and other open, wet places at lower to mid-elevations.
Bulb-bearing water-hemlock (<i>Cicuta bulbifera</i>)	D	G5 S2	S	Edges of marshes, lake margins, in bogs, wet meadows, shallow standing water, or along slow moving streams, 2200-3720 ft.

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Vascular Species	D or S	Global & State Ranks	WA Status	Habitats
Long-bract frog orchid (<i>Coeloglossum viride</i> var. <i>virescens</i>)	S	G5 S1	T	In aspen stands within coniferous forests of Engelmann spruce, Douglas fir, or Sitka alder, 3800-4500 ft.
Stellar's rockbrake (<i>Cryptogramma stelleri</i>)	D	G5 S1S2	S	Moist, shaded cliffs and ledges, commonly on limestone cliffs, 3000-6000 ft.
Yellow lady's-slipper (<i>Cypripedium parviflorum</i>)	D	G5 S2	T	Bogs and wet forests, perennial streams on limestone rock under mixed coniferous forest, 2100-3440 ft.
Drummond's mountain-avens (<i>Dryas drummondii</i>)	D	G5T5 S2	S	Crevice of steep, rocky, dry cliffs, and on limestone rock along rivers, 1900 to 6800 ft.
Crested shield-fern (<i>Dryopteris cristata</i>)	D	G5 S2	S	Fens, wet meadows and wooded swamps, 2150-4100 ft.
Green keeled cotton-grass (<i>Eriophorum viridicarinatum</i>)	D	G5 S2	S	Cold, sometimes calcareous, swamps and bogs, 2000-6600 ft.
Arctic aster (<i>Eurybia merita</i>)	D	G5 S1S2	T	Open, rocky places, rock crevices, and unstable slopes, mostly at high elevations.
Creeping snowberry (<i>Gaultheria hispidula</i>)	D	G5 S2	S	Sphagnum bogs and forests, 3000-6000 ft.
Water avens (<i>Geum rivale</i>)	D	G5 S2S3	S	Wet meadows, bogs, riparian zones along perennial streams, and moist old pastures, 2500-6400 ft.
Sandberg desert parsley (<i>Lomatium sandbergii</i>)	D	G4 S1	T	Dry, rocky, or open slopes and ridges in the upper montane to subalpine zones.
Bog clubmoss (<i>Lycopodiella inundata</i>)	S	G5 S2	S	Sphagnum bogs, wet, sandy places, wetlands near lakes, and swampy ground, 1800 ft.
Treelike clubmoss (<i>Lycopodium dendroideum</i>)	D	G5 S2	S	Rock outcrops, talus or boulder fields, often with a moss and organic debris layer, ecotone between meadow or wetland and adjacent forest, near the base of large boulders in a fairly dense ground cover, 3000-3650 ft.
Marsh muhly (<i>Muhlenbergia glomerata</i>)	D	G5 S1S2	S	Along stream-banks, meadows, marshes, bogs, and the shores of ponds and lakes, 2900-3500 ft.
Mexican muhly (<i>Muhlenbergia mexicana</i>)	D	G5T5 SNR	S	Moist forests, edges of wetlands, 2500 ft.
Adder's tongue (<i>Ophioglossum pusillum</i>)	D	G5 S1S2	T	Pastures, old fields, roadside ditches and flood plains in forests, seasonally wet, acid soil, 2800-3200 ft.
Common twinpod (<i>Physaria didymocarpa</i> var. <i>didymocarpa</i>)	S	G5T4 S1	T	Steep shale outcrops, rocky flats, talus slopes, dry hillsides, or road cuts, 2000-5400 ft.
Whitebark pine (<i>Pinus albicaulis</i>)	D			Subalpine forests to 7000 ft.
Small northern bog-orchid (<i>Platanthera obtusata</i> ssp. <i>obtusata</i>)	D	G5 S2	S	Damp or wet places in forests, marshes, bogs, meadows, and along stream-banks, 800 to 5000 ft.
Wheeler's bluegrass (<i>Poa nervosa</i>)	D	G3? S2	S	Low elevation wet habitats, forest openings with minimal canopy cover, mossy rock outcrops, cliff crevices and occasionally talus.
Idaho gooseberry (<i>Ribes oxycanthoides</i> ssp. <i>irriguum</i>)	D	G5T4 S2	T	Along streams, meadow openings near streams, and slopes of moist to dry canyons, 3000-5000 ft.
Lowland toothcup (<i>Rotala ramosior</i>)	S	G5 S1	T	Riparian wetlands growing below high water, often in a community of small emergent annuals, 2200 ft.
Hoary willow (<i>Salix candida</i>)	D	G5 S1	T	Bogs, fens, and swampy areas in peat soils, 2000-3000 ft.

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Vascular Species	D or S	Global & State Ranks	WA Status	Habitats
MacCall's willow (<i>Salix maccalliana</i>)	D	G5? S1	S	Bogs, fens, swamps, and marshes in open, low-lying sites in peat soils, 2400-3000 ft.
False mountain willow (<i>Salix pseudomonticola</i>)	D	G4G5 S1	S	Fens, 2900 ft.
Black snake-root (<i>Sanicula marilandica</i>)	D	G5 S2	S	Moist, meadows, riparian flood plains, moist woods, and marsh edges, often on calcareous substrates. 1800-3050 ft.
Strict blue-eyed grass (<i>Sisyrinchium montanum</i>)	D	G5 S1	T	In a small natural seeps or springs at low elevations in Ponderosa pine forests.
Prairie cordgrass (<i>Spartina pectinata</i>)	D	G5 S2	S	Wet areas such as swales, meadows, edges of marshes and ponds, and along streams and riverbanks, 2000 ft.
Flat-leaved bladderwort (<i>Utricularia intermedia</i>)	S	G5 S2	S	Shallow ponds, slow-moving streams, and wet sedge or rush meadows, to 4000 ft.
Velvet-leaf blueberry (<i>Vaccinium myrtilloides</i>)	S	G5 S1	S	Dry or moist, sandy or rocky clearings and open forests, also in sphagnum bogs and swamps, 2000-3000 ft.
Kidney-leaved violet (<i>Viola renifolia</i>)	D			Moist, forested sites, and sometimes along ditches or streams, 2300-4400 ft.
Non-vascular Species, Mosses				
Splashzone moss (<i>Scouleria marginata</i>)	S	G3 S2	T	Semi-aquatic on rocks along the edge of streams.
Non-vascular Species, Lichens				
Brook lichen (<i>Dermatocarpon meiophyllizum</i>)	S	G3G5 S2	T	Aquatic; on rocks, boulders and bedrock in streams, rivers, or seeps, usually submerged or inundated for most of the year.
Angel's hair (<i>Ramalina thrausta</i>)	D	G4G5 S2	T	Moist, cool, late-successional forests.
Urn lichen (<i>Tholurna dissimilis</i>)	S	G3G5 S2	S	On twigs and branches of exposed conifers, in humid subalpine and alpine habitats.

APPENDIX B
RECOMMENDED NATIVE SEED MIX

% OF MIX	COMMON NAME	SCIENTIFIC NAME	PLS LBS/ACRE	BIOTYPE
25	Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>	4.0	Region 1 Northwest Zone
19	Idaho Fescue	<i>Festuca idahoensis</i>	3.0	Winchester
19	Blue Wildrye	<i>Elymus Glaucus</i>	3.0	Umatilla
19	Mtn. Brome	<i>Bromus marginatus</i>	3.0	Reecer Creek
6	Prairie Junegrass	<i>Koeleria macrantha</i>	1.0	Sinlahekin
4	Tufted Hairgrass	<i>Deschampsia cespitosa</i>	0.5	Upper Yakima
3	Spike Bentgrass	<i>Agrostis exarata</i>	0.4	Upper Yakima
4	Broadleaf Lupine	<i>Lupinus Latifolius</i>	0.7	Upper Yakima
1	Western Yarrow	<i>Achillea millefolium</i>	0.20	Wenatchee Creek
100			15.8	